

Docket No. 253.44337X00
Serial No. 10/511,730
Office Action dated March 24, 2006

AMENDMENTS TO THE CLAIMS

The following listing of claims replaces all prior listings, and all prior versions, of claims in the application.

LISTING OF CLAIMS:

1. (Currently Amended) A method for producing a digital topographic map, comprising the following steps of:

~~a step for dividing a basic map, which is produced through a UTM drawing method, into grid-like sectors at a predetermined distance, and;~~

~~further dividing the each sector obtained into a smaller one, to thereby producing produce small sectors while;~~

~~interpolating discontinuous data being in short between each sectors-sector and within between each of the small sectors;~~

~~a step for producing digital data by relating using an algorithm to relate x,y coordinates of the small sector obtained and a sea level sectors to elevation levels obtained through measurement, upon basis of an algorithm having a rationality, and;~~

~~connecting the small sectors being same in the sea level thereof at a common elevation with a straight line, thereby producing a first topographic map, on which contour lines are formed with lines of line segments; and~~

~~a step for conducting a smoothing process upon on the contour lines of said first topographic map to produce, mathematically, thereby producing a second topographic map, on which the contour lines are formed with curved lines, being that are smoother than the contour lines-lines of said first topographic map, which are formed with the lines of segments.~~

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2. (Currently Amended) The method for producing a digital topographic map, as described in ~~the claim 1~~, wherein the digital data for ~~producing said second topographic map therefrom~~ is stored with map element data ~~into~~ in a recording means, and those data are displayed on a display means, ~~being composed into as a single or a multi-layer structure thereof, or can be, or~~ outputted on a paper ~~or the like,~~ as a topographic map.

3. (Currently Amended) The method for producing a digital topographic map, as described in ~~the claim 1 or 2~~, wherein a checking function is provided for checking ~~on whether the mathematical smoothing process is conducted, appropriately or not,~~ so that the ~~lines of line~~ segments ~~come~~ cross with each other, when producing said first topographic map, by connecting said small sectors having the same sea elevation level, sequentially.

4. (Currently Amended) The method for producing a digital topographic map, as described in ~~one of the claims 1 to 3~~ claim 1, wherein ~~the an~~ irregular quadrilateral, ~~which is produced upon basis of from~~ the basic map and the map elements through said UTM drawing method is revised and interpolated, ~~mathematically, to be to form~~ a right-angled quadrilateral, thereby producing a third topographic map.

5. (Currently Amended) The method for producing a digital topographic map, as described in ~~the claim 44~~, wherein user map elements, which are produced independently by a user, are stored ~~into~~ in said recording means as a database, and ~~these the~~ user map elements and said third topographic map are displayed on said

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display means, ~~being composed into as a single or a multi-layer structure thereof, or~~
~~can be, or~~ outputted on a paper ~~or the like,~~ as a topographic map.

6. (Currently Amended) A method for producing a digital topographic map,
comprising the following steps of:

~~a step for~~ dividing a basic map, which is produced through a UTM drawing
method, into grid-like sectors at a predetermined distance, ~~and;~~

further dividing the ~~each~~ sector obtained into a smaller one, ~~to~~ thereby
~~producing~~ produce small sectors ~~while;~~

Interpolating discontinuous data ~~being in short between each sectors~~ sector
and ~~within~~ between each of the small sectors;

~~a step for~~ producing digital data by ~~relating using an algorithm to relate x,y~~
coordinates of the small ~~sector~~ sectors ~~to obtained and a sea~~ an elevation level
obtained through measurement, ~~upon basis of an algorithm having a rationality, and;~~

connecting the small sectors ~~being same in the sea level thereof~~ at a common
elevation with a straight line, thereby producing a first topographic map, on which
contour lines are formed with ~~lines of~~ line segments;

~~a step for~~ conducting a smoothing process ~~upon on~~ the contour lines of said
first topographic map, ~~mathematically, thereby producing to produce~~ a second
topographic map, on which the contour lines are formed with curved lines, ~~being that~~
are smoother than the contour ~~lines~~ lines of said first topographic map, ~~which are~~
~~formed with the lines of~~ segments;

~~a step for~~ revising and interpolating the ~~an~~ irregular quadrilateral, which is
produced ~~upon basis of~~ from the basic map and the map elements through said UTM
drawing method, ~~mathematically, to be to form~~ a right-angled quadrilateral, thereby

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producing a third topographic map from said second topographic map; and
~~a step for storing digital data for producing said third topographic map, into~~ in
 a recording means, together with map element data, ~~and thereby;~~
 displaying ~~these the~~ data on a display means, ~~being composed into as a~~
 single or a multi-layer structure thereof, or outputting ~~them the~~ data on a paper or the
 like, as a topographic map.

7. (Currently Amended) The method for producing a digital topographic map,
 as described in ~~the~~ Claim 6, wherein upon displaying the third topographic map
 displayed on said display means ~~are displayed a~~ color scale, which is divided by
 colors depending upon the sea elevation levels, ~~and is also displayed, the color~~
scale including a dialog having a slide bar, which is freely movable along said color
 scale, whereby said third topographic map can be colored by an arbitrary color for
 each of the sea elevation levels by moving said slide bar along with said color scale.

8. (Currently Amended) The method for producing a digital topographic map,
 as described in ~~the~~ Claim 6, wherein upon displaying said third topographic map
 displayed on said display means ~~are displayed a sea level displaying column an~~
elevation level column is also displayed for indicating ~~a sea level the elevation~~ of an
 arbitrary contour line therein, and wherein a dialog having a color palette is also
displayed for designating a color of the contour ~~line~~ line to be colored, whereby the
 contour lines of said third topographic map can be colored with an arbitrary color for
 each of the sea elevation levels thereof by inputting the sea level elevation of the
 contour line to be colored into said sea elevation level displaying display column and
 a color through said color pallet.

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9. (Currently Amended) The method for producing a digital topographic map, as described in any one of ~~the~~ Claims 6 to 8, wherein a sub-screen is displayed on said display means, ~~on which~~ where said third topographic map is displayed, and on said sub-screen are displayed a ~~third~~ fourth topographic map on a periphery continuous with the third topographic map of an arbitrary place that is displayed on said display means, by a map number and/or a map name.

10. (Currently Amended) The method for producing a digital topographic map, as described in ~~any one of the Claims 6 to 9~~ Claim 6, wherein said third topographic map is displayed on said display means ~~is displayed~~ ~~said third topographic map~~, together with an X-axis cursor and a Y-axis cursor intersecting in a cross, whereby ~~displaying~~ latitude and altitude of said intersecting point are displayed in a portion of said display means, by moving said X-axis and said Y-axis cursors ~~into an arbitrary direction, so as to fit the intersecting point at an arbitrary place on said third topographic map.~~

11. (Currently Amended) The method for producing a digital topographic map, as described in ~~any one of the Claims 6 to 10~~ Claim 6, wherein points are set up in plural numbers ~~thereof~~ on said third topographic map ~~displayed on said display means, and these plural numbers of points are~~ and connected by a straight line or a smoothly curved line, whereby ~~displaying~~ a cross-section of said third topographic map, ~~being cut by said straight line or said curved line,~~ is displayed in a part of said display means.

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12. (Currently Amended) The method for producing a digital topographic map, as described in ~~any one of the Claims 6 to 11~~ Claim 6, wherein arbitrarily two (2) arbitrary points are set up on the a contour line, having the same sea elevation level ~~upon on~~ said third topographic map ~~displayed on said display means, intersecting~~ intersect a river thereby, and those two (2) points are connected with a straight line, whereby ~~displaying a cross-section of the river cut by said straight line, is displayed~~ in a part of said display means, and ~~also calculating out pondage in an upstream side thereof is also calculated~~ than said straight line, from said contour lines, and said straight line and said cross-section.

13. (Currently Amended) The method for producing a digital topographic map, as described in ~~any one of the Claims 6 to 12~~ Claim 6, wherein arbitrarily two (2) arbitrary points are set up on the a contour line, having the same sea elevation level, surrounding a lake or a swamp on said third topographic map ~~displayed on said display means, intersecting~~ intersect the lake or the swamp thereby, and those two (2) points are connected with a straight line, whereby ~~displaying a cross-section of the lake or the swamp cut by said straight line, is displayed~~ in a part of said display means, and ~~also calculating out pondage of said lake or the swamp is also calculated, from said contour lines and said cross-section.~~

14. (Currently Amended) The method for producing a digital topographic map, as described in ~~any one of the Claims 6 to 13~~ Claim 6, wherein upon displaying said third topographic map ~~displayed on said display means, is displayed~~ an arrow of indicating is displayed to indicate a direction and/or a magnitude of an inclination of ~~configuration of land.~~

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15. (Currently Amended) An apparatus for producing a digital topographic map, comprising:

a means for dividing a basic map, ~~which is produced through a~~ UTM drawing method, into grid-like sectors at a predetermined distance, and further dividing ~~the~~ each sector obtained into ~~a smaller one, thereby producing small sectors while~~ interpolating discontinuous data ~~being in short between each sectors~~ sector and ~~within each of the small sectors, and reading sea elevation levels from digital data of~~ the digital topographic map, so as to be aligned on a plane to be blocked, thereby producing mesh-like data, and further storing ~~them~~ the data as vector data therein;

a means for producing a first topographic map, by reading out the vector data for each of the small sectors stored in said storing means, so as to ~~conduct a process of connecting the~~ connect each small sector with a straight line while selecting a measurement point in a vicinity thereof when the elevation ~~sea is is the~~ same judging from data of defining tolerance on the sea elevation level, without intersection on those line segments with each other, ~~upon basis of an algorithm having rationality;~~

~~a means for producing a second topographic map, by conducting a smoothing process upon curved lines, passing through a contact point of the line segments of said first topographic map obtained in said process, and having continuous differential coefficients, mathematically, thereby producing the second topographic map, on which the contour lines are made up with a group of curved lines;~~

a means for producing a third topographic map from said second topographic map, by revising and interpolating an irregular quadrilateral, which is produced upon

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basis of said basic map produced through the UTM drawing method, and also map elements, ~~mathematically~~, into a right-angled quadrilateral;

a recording means for storing therein said digital data for producing said third topographic map, together with map element data; and

a display means for ~~composing~~ displaying the digital data stored within said recording means into a single or a multi-layer structure, ~~so as to display thereon~~.